

<b>INSTITUTE</b>	<b>FACULTY OF TECHNOLOGY</b>
<b>PROGRAM</b>	<b>BACHELOR OF TECHNOLOGY (CIVIL ENGINEERING)</b>
<b>SEMESTER</b>	<b>4</b>
<b>COURSE TITLE</b>	<b>CONCRETE TECHNOLOGY</b>
<b>COURSE CODE</b>	<b>01CI3401</b>
<b>COURSE CREDITS</b>	<b>3</b>

**Objective:**

- 1 To understand the key ingredients of concrete and their influence on the quality and properties of the final product
- 2 To explore the properties, testing methods and factors influencing fresh and hardened concrete.
- 3 To learn about concrete durability, special concrete types and the mix design principles used in the concrete industry

**Course Outcomes:** After completion of this course, student will be able to:

- 1 Analyze the impact of cement, aggregates, water and admixtures on concrete's properties and performance
- 2 Determine and analyze the properties of fresh and hardened concrete using laboratory test
- 3 Analyze the durability of concrete against various environmental and chemical factors affecting its performance.
- 4 Design concrete mixes based on IS codes and apply knowledge of special concrete types to meet various construction requirements.

**Pre-requisite of course:**None

**Teaching and Examination Scheme**

<b>Theory Hours</b>	<b>Tutorial Hours</b>	<b>Practical Hours</b>	<b>ESE</b>	<b>IA</b>	<b>CSE</b>	<b>Viva</b>	<b>Term Work</b>
2	0	2	50	30	20	25	25

<b>Contents : Unit</b>	<b>Topics</b>	<b>Contact Hours</b>
1	<b>Concrete Ingredients</b> Introduction: Historical background, Ingredient of concrete, Cement: Chemical composition, Heat of hydration, Physical tests of cement, Aggregates: Categorization of aggregate, Grading, Testing of aggregates., Water: General requirements and impurities in water, Admixtures: Types (plasticizers, accelerators, retarders) and their impact on concrete properties.	5

<b>Contents : Unit</b>	<b>Topics</b>	<b>Contact Hours</b>
2	<b>Fresh Concrete</b> Fresh Concrete Properties of fresh concrete, Workability tests as per IS standards, factors affecting workability, Segregation & Bleeding, Mixing, Transporting, Placing, Compaction, Finishing of concrete at site. Curing methods and their necessity	4
3	<b>Hardened Concrete</b> Properties: Strength, modulus of elasticity, shrinkage, and creep, Testing Hardened Concrete: Compressive strength, flexural strength, and non-destructive testing (rebound hammer, ultrasonic pulse velocity), Failure Mechanism: Behavior under compression, tension and cracking	4
4	<b>Durability and Permeability</b> Causes of deterioration: Chemical attacks, physical degradation, and environmental effects and Factors affecting durability, Transport mechanism: Gases & fluid Movement in concrete, Cracking: Carbonation induced & corrosion-induced cracking, Durability Problems: Alkali-aggregate reaction, Degradation by freeze & thaw, Sulphate attack, Durability under sea-water (marine environment)	6
5	<b>Special Concrete and Concreting</b> Fiber-reinforced concrete, Polymer modified concrete, Selfcompacting concrete, Lightweight concrete, Ready Mix Concrete Hot & cold weather concreting, Precast Construction method	4
6	<b>Mix Design of Concrete</b> Mix Design Principles of concrete mix design, Parameters, and factors influencing mix design, Indian Standard methods of mix design, Acceptability criteria, variability of results, Various provisions of IS code for sound concrete	5
<b>Total Hours</b>		<b>28</b>

#### Suggested List of Experiments:

<b>Contents : Unit</b>	<b>Topics</b>	<b>Contact Hours</b>
1	<b>Experiment No. 1</b> Standard Consistency of Cement	2
2	<b>Experiment No. 2</b> Initial and Final Setting time of Cement	2
3	<b>Experiment No. 3</b> Initial and Final Setting time of Cement	2
4	<b>Experiment No. 4</b> Compressive Strength Test of Cement	2
5	<b>Experiment No. 5</b> Sieve Analysis of Aggregate	2
6	<b>Experiment No. 6</b> Shape Test of Aggregate	2

### Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
7	<b>Experiment No. 7</b> Specific Gravity of Aggregate	2
8	<b>Experiment No. 8</b> Impact Value of Aggregate	2
9	<b>Experiment No. 9</b> Impact Value of Aggregate	2
10	<b>Experiment No. 10</b> Concrete Mix Design and Slump test of Fresh concrete	2
11	<b>Experiment No. 11</b> Compressive strength of concrete cube	2
12	<b>Experiment No. 12</b> Split Tensile Strength Test of Concrete cylinder	2
13	<b>Experiment No. 13</b> NDT Testing - Rebound Hammer Test	2
14	<b>Experiment No. 14</b> NDT Testing – Ultrasonic Pulse Velocity Test	2
<b>Total Hours</b>		<b>28</b>

### Textbook :

- 1 Concrete Technology, M.S. Shetty, S Chand Publication, 2016

### References:

- 1 Concrete Technology, Concrete Technology, M.S. Shetty, S Chand Publication, 2019

### Suggested Theory Distribution:

The suggested theory distribution as per Bloom's taxonomy is as follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery					
Remember / Knowledge	Understand	Apply	Analyze	Evaluate	Higher order Thinking / Creative
15.00	15.00	30.00	30.00	10.00	0.00

### Instructional Method:

- 1 Prerequisite of the course and its pattern shall be discussed on the commencement of the course
- 2 Lectures shall be conducted in class room using various teaching aids.
- 3 Presence in all academic sessions is mandatory which shall carry 5% marks of the total internal evaluation

**Instructional Method:**

- 4 At the end of each unit/topic an assignment based on the course content shall be given to the students which shall carry 5% weightage for timely completion and submission of the assigned work
- 5 The laboratory experiments are planned in such a way that it covers the practical aspects of the course contents. The performance of these experiments shall bring the clarity of the theoretical concepts which the students have studied during the academic sessions

**Supplementary Resources:**

- 1 [https://www.iare.ac.in/sites/default/files/MTE\\_%20PPT.pdf](https://www.iare.ac.in/sites/default/files/MTE_%20PPT.pdf)